DOCUMENT RESUME

ED 156 423 SE 024 062

AUTHOR Horn, B. Ray
TITLE A General Systems Approach to Transnational Environmental Communication (TEC) Networks.
PUB DATE Feb 78
NOTE 12p.; Paper presented at the annual meeting of the American Association for the Advancement of Science (Washington, D.C., February 1978); Contains occasional light and broken type

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Communications; *Environmental Education; *Global Approach; Information Dissemination; Natural Resources; Needs Assessment; *Problem Solving; Systems Concepts; World Problems

ABSTRACT

Human societies are beginning to direct many of their communication activities toward developing and maintaining a healthy global system. This paper focuses on two areas: (1) communication and eco-development problems, and (2) a worldwide assessment of environmental communication and education resource needs. Current research to develop and articulate an ideal Transnational Environmental Communication (TEC) system is identified. It is argued that the conceptualization of certain global problems and efforts to solve them can be significantly advanced by using General Systems concepts. An extensive listing of references is included. (Author/MA)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

B. Ray Horn

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

ED156423

A GENERAL SYSTEMS APPROACH TO TRANSNATIONAL ENVIRONMENTAL COMMUNICATION (TEC) NETWORKS*

B. Ray Horn

Environmental Communication Program
School of Natural Resources
The University of Michigan

ABSTRACT

Human societies are beginning to direct many of their communication activities toward developing and maintaining a healthy global system. This is reflected in the current activities of such United Nations agencies as UNESCO and UNEP, which have recently launched a joint worldwide program to assess and deliver information, education, and communication programs that deal with natural resource, energy, and other environmental problems. Complementing this new thrust, this paper focuses on two areas: (1) communication and eco-development problems, and (2) a worldwide assessment of environmental communication and education resource needs. Current research to develop and articulate an ideal Transnational Environmental Communication (TEC) system is identified. Argued is that the conceptualization of certain global problems and efforts to solve them can be significantly advanced by using General Systems concepts.

INTRODUCTION

There were once two men lost in a deep forest. One man was blind, the other lame. The blind man could only stumble about in the maze of trees, deepening his dilemma. The lame man, on the other hand, could see a path threading out of the forest but could not walk along the path. The two men groped about in their helplessness until one day the lame man said to the blind one, "If you can put me on your shoulders, then I can be your eyes and you my legs, and together we can leave this darkness."

This paper assumes that only together can nations or other groups overcome their limitations and find their way out of a world dark with problems yet bright with new opportunities. Such opportunities promise a basis for worldwide problem-solving never before experienced.

The mainspring of my paper is the argument that the conceptualization of certain global problems and efforts to solve them can be significantly advanced by using General Systems concepts. Indeed, it is because such global problems have become increasingly intractable and the world system has become increasingly indeterminate that General Systems concepts are needed more than ever.

Basic to my argument is the observation that before any planned change in the status of world problems can occur, someone must first communicate something to someone. Thus, human communication becomes a fundamental problem-solving tool, a fundamental social process. Through communication, the needs and wants of human groups are shared within the group as well as with others outside, and with future generations. Human communication, therefore, is seen as the essential fabric of the world community, weaving together all relationships from individual to global.

But, as important as humans and their communication networks are, they can only live and prosper in a healthy biophysical context. In fact, the development of human communication systems may be viewed as the central way in which societies organize in order to draw upon and alter their biophysical environments to meet their perceived needs and aspirations.

When the health of a society's biophysical environment is low or endangered, then, it is only natural that human societies begin to direct much of their communication activities toward changing the situation. In fact, socio-cultural and biophysical systems have been experiencing such pronounced unwanted mutual impacts on a global scale that the design of worldwide environmental communication networks and programs to deal with such problems has become a major preoccupation of governmental and non-governmental organizations around the world during the past few years.

In 1972, for example, this worldwide concern led to the United Nations Conference on the Human Environment, held in Stockholm. At that meeting, the vital role of communication and education in promoting new images to guide global environmental problem-solving and policy-development was stressed. More specifically, Conference Recommendation 96 called for the establish-

*Prepared for panel on "Organizational and Institutional Implications of General Systems Thinking," at the joint Annual Meeting of the Society for General Systems Research (SGSR) and the American Association for the Advancement of Science (AAAS), Washington, D.C., 15 February 1978.

SE 024 062

ment of an international program to educate people as to the steps they might take, within their means, to manage and control their environment.

In response to Recommendation 96, UNESCO and UNEP[1] jointly established an international environmental education program and funded it with $4 million for its initial three-year phase. In October of last year, 1977, to culminate the program's beginning phase, the world witnessed the first United Nations Intergovernmental Conference on Environmental Education, held in the USSR. At this policy-level meeting (UN Category II), official delegations from the UN member states, organizations of the UN system, and other international governmental and non-governmental organizations met. For all practical purposes, the policy recommendations of that meeting were binding for the countries and organizations present. Thus, we can see that environmental communication and education programs have finally reached their rightful theater, the global community.

Complementing the thrust of this emerging UNESCO-UNEP program, this paper will focus on the following areas important to the assessment and delivery of information, education, and communication programs that deal with natural resource, energy, and other environmental problems within a global context:

(1) communication and eco-development problems, and

(2) a worldwide assessment of environmental communication and education resource needs.

This paper, then, after outlining some key problems of the world system, briefly describes a recently completed empirical study of environmental communication and education resource needs in 136 countries, a study conducted by this author and two other principal investigators (Dr. William B. Stapp and Dr. Louis Albala-Bertrand) as part of the new UNESCO-UNEP program. Within the problem and need context provided herein, this paper will also identify some of the relevant background work completed, and now in progress, at the University of Michigan. This work is ultimately aimed at the development and articulation of an ideal Transnational Environmental Communication (TEC) network delivery system to meet established needs.

COMMUNICATION AND ECO-DEVELOPMENT PROBLEMS

A humanistic approach to transnational environmental problem-solving must be rooted in the more general process of worldwide human and ecological development and the "outer limits" of biophysical systems. At present, it is widely known that our planet suffers from some serious natural resource and socio-economic imbalances as well as threats to ecological diversity. Recent data, moreover, cogently suggest that many such problems (especially the imbalances within and between nations) are actually being amplified. For example, the income gap between the richest 10-20 percent and the poorest 20-40 percent within many countries has been significantly widening (cf. Schramm and Lerner, 1976; Bergsten, 1973; Weisskopf, 1977).

As a partial consequence of such imbalances, the conventional mechanistic models and media of human communication and their role in national development have been brought into serious question. When Schramm's classic work on communication and development appeared in 1964, for example, many internationally-oriented communication experts thought there was little knowledge yet to be gained. But the ensuing decade revealed some deep cracks in some of the conventional communication and development models. Unaffraid to think in new ways based on new information--the hallmark of a real scholar--more recent examinations by Schramm as well as others have shown a significant shift in thinking (cf. Laszlo, 1974; Laszlo et al., 1977; Markley, 1974; Matthews, 1976; Mesarovic and Pestel, 1974; Richstad and Harms, 1973; Saint and Coward, 1977; Schramm and Lerner, 1976; Somavía, 1977; Rogers, 1976; Tinbergen et al., 1976; UNESCO, 1975, 1977; World Bank, 1975). Summarized below are five major themes of this shift.

1. The narrow meaning of "development." This first theme of the recent shift in thinking arises from the narrow focus of conventional development models on excessively materialistic and aggregate GNP growth objectives. Such a focus did not totally exclude other values, but it did overshadow them to the near neglect of values related to overall human development, to environmental quality, and to social justice.

Like traditional economics, the conventional development models dealt narrowly and selectively with easily quantifiable concepts, such as the quantities of goods produced, man-hours of input, capital investments, interest rates, tax rates, volumes of international trade, prices, gold reserves, and money in circulation. These traditional economic concepts are still relevant, but so are many other less-quantifiable variables, which are socio-cultural, psychological, political, or ecological in origin (Rapoport, 1975). To be sure, some aspects of these "softer" variables may be quantifiable and therefore amenable to a "hard" economic calculus, but many clearly operative phenomena are not.

Although the commitment to national development has been worldwide, its meaning has been shifting beyond the materialism and aggregate growth objectives which dominated the conventional models. The new models include such multiple objectives as sustained improvements in the quality of life, more equitable participation in the benefits of development, the elimination of acute poverty, higher employment rates, more equitable income distribution, relative price stability, and a fairer international economic order based more on trade than aid. Tied to the recent shift in meaning has also been a disenchantment of some less-developed countries, in particular, with the global impacts of some of the products and by-products of the highly industrialized regions.

For the purposes of this paper, perhaps the most important implication of the shift in meaning has been the choice of objectives and modes of human communication used to govern the exchanges of information within and between nations. In a surprisingly consistent and mutually reinforcing way, moreover, the conventional development models have seemed to call for models of communication which are also conventional and mechanistic. And, conversely, the use of conventional mechanistic communication models has tended to support the conventional development models.

The current thinking about the role of communication in development also suggests that it is unlikely that the newer concepts of development could be sustained by relying principally on the conventional mechanistic communication models, for either within or between-nation communication. Indeed, significant changes in the more general communication structures and processes of society will be needed to support the newer concepts of development. Ecologically-sound images, for example, will need to be promoted by the commercial communications industry as well as multileveled popular participation in the selection and design of local, national, regional, and worldwide communication efforts. If Schramm's proposition that "Every stage of society has its appropriate stage of communication" (1964:41) is generally true, then it is not surprising that conventional communication models are being transformed.

2. <u>The over-emphasis on high-level capital-intensive technologies</u>. A concern over the implications of certain technologies has also occurred. Over the past few decades, during the rapid development of high-technology mass-audience communication media (such as network television, communication satelites, and postal service technology), a direct positive causal relationship had been assumed between the use of such media and national development.

Recent studies, however, have begun to show that such media have been playing a lesser role than previously suspected. For example, upon being asked how they had learned about innovative ideas, survey respondents in less-developed countries almost always reported the use of word-of-mouth communication network channels as the prime source of influence on the adoption of a new idea (Rogers and Shoemaker, 1971).

The over-emphasis on high-level mass-audience communication technologies has also become a concern because they have seldom been designed to create the conditions under which a two-way exchange of information could take place, either within or between nations. Indeed, it is likely that this has contributed to some of the enormous global imbalances in the flow of information. UNESCO, for example, estimates that the quantitative flow of information from the industrialized nations to the less-developed countries is about 100 times the flow in the opposite direction (Naesselund, 1975). In fact, it has been questioned whether the current organization of such media can be called a "communication system" since it apparently lacks some very fundamental conditions needed to keep it viable. Such media may more properly be called mass-audience message-distribution channels, since they lack the ability to listen to their audiences except in a very delayed and skewed way. Even if they had adequate listening capabilities, their range of responsiveness to their audiences may be seriously constrained by the special interests of some of their sponsors.

The nearly instantaneous worldwide spread of ideas made possible through advanced technology, moreover, has carried with it some inaccurate perceptions about the relationships between people and their environment. In fact, the development and spread of high-technology communication media in itself has more than likely contributed along with other interrelated influences to the rapidly deteriorating biophysical environment. High-level technologies, to be sure, clearly have their place where certain preconditions are met, but other middle-range technologies, in particular, must be available to broaden the spectrum of alternatives, to fill the gaps, and to meet other needs (Schumacher, 1973).

To be consistent with the new concepts of development, perhaps new communication structures and processes should focus on the production and use of low-waste, resource-conserving, energy-saving, employment-enhancing communication technologies. Such technologies would also allow the prime targets of the United Nations' development efforts--the rural poor in less-developed countries--to participate more actively in

the self-development process. Thus, current thinking about the role of communication in development has shifted toward the establishment and maintenance of a balance between the use of high-level capital-intensive technologies and the use of less energy-and-capital-intensive resources and techniques on the local level.

3. The high degree of dependence of some nations on others. Parts of the world do not merely co-exist, they interact. Following the conceptualization by Weisskopf, "dependence" involves two essential elements of interaction:

> Thus, a given nation has a dependent relationship with another nation (or group of nations) insofar as the relationship is both close and asymmetrical, with the result that the given nation is in some significant way subordinated to the other(s) (Weisskopf, 1977:3).

Although dependence can be across multiple dimensions (economic, political, etc.), our present theme focuses on "soft" and "hard" communiction and education materials and media.

Concerns about dependency have brought about a reexamination of the production and distribution of some materials and media. And, conversely, their content has often triggered concern about dependency. Pushed to its extreme, cultural dependency is often said to be like having to brush your teeth twice a day when you have nothing to eat. Such extremes aside, no sooner does the international consultant arrive in some countries than he or she quickly recognizes the high volume of foreign-produced films, TV programs, news reels, textbooks, magazines, etc. Also, the output of almost every news agency, data bank, and information-retrieval system is foreign. Mass media products in many less-developed countries, moreover, come mainly from the merchandising activities of only a few multi-national corporations (cf. Nordenstreng and Varis, 1974), and these products reflect the socio-cultural values of the countries where they are produced and first marketed.

A popular yet powerful example of the potential impact of communication content in a less-developed country is eloquently provided by Dorfman and Mattelart (1976). Analyzing the seemingly innocuous lifestyle of Walt Disney's comic book character, Donald Duck, Dorfman and Mattelart illustrate the spread of economic and environmental values. Some of these values, to be sure, may be inappropriate for a country's stage of development, or for their indigenously determined needs and wants.

Thus, because of such recent studies on media socialization (cf. Halloran, 1976), the rising concern over the adverse effects of some advertising content (cf. Barnet and Müller, 1974:182-84), the increase in local talent, a rising sense of national and regional efficacy, and other interrelated influences (cf. Bergsten, 1973:103), there has been a shift (within less-developed countries in particular) toward the use of fewer foreign produced and distributed materials and media. At its base, this shift reflects the emergence of new non-colonial patterns of socio-cultural development, which places higher values on self-reliance and self-determination.

4. The wide socio-economic gaps between and within some nations. Current thinking suggests that much of the imported materials and media used in some countries have been increasing the socio-economic gaps among the various social strata within a nation, and between urban and rural populations. While part of the original assumption was that the imported media would narrow the gaps through what has been called a "trickle down" theory of development, some recent research indicates that the imported media may be contributing to the widening of gaps (cf. Rogers, 1976).

Again, a shift toward systems thinking tells us that "rich" and "poor" distinctions are far from being isolated categories (although the current "rich-nation/poor-nation" variance has been popularly estimated at about a 13 to 1 disparity). Instead, such "rich" and "poor" distinctions (and other issues of distributive justice) are relational concepts; that is, the "rich" and "poor" are interrelated systems with mutual and multiple interactions, which have some emergent properties of their own, but which also mutually interact and partially affect each other (cf. Kim, 1971). Each of these systems, moreover, interacts and draws upon its biophysical environment in unique ways. The poor in many countries, for example, tend to suffer from some environmental problems attributed to "underdevelopment" itself, such as a high vulnerability to natural disasters, excessive soil loss, and the distruction of forests for cooking and heating fuel.

Thus, the current shift in thinking recognizes that a two-way mutually causal relationship is likely significant between low socio-economic status and low environmental quality. UNEP sums it up this way:

> a major factor in understanding the cause of environmental problems, and in seeking solutions to them, is the skew in living standards between rich and poor. This skew is, of course, apparent within and between countries; in both cases extreme inequali-

> ties of wealth make it difficult for society as a whole to benefit from natural resources and lead to environmental damage by both the poor and the privileged. Therefore the pursuit of environmental objectives is complementary to the pursuit of the new international economic order (UNESCO, 1977:10).

So, consistent with such an observation, there has been a shift toward the design and use of communication and education forms and processes which take into account the complex layering of social systems, and which are directed at multiple socio-economic strata. The educated urbanite, therefore, will no longer be the only major beneficiary ~~factor~~ of communication and development programs in most less-developed countries.

5. The low degree of local participation in some national and international communication and development efforts. The shift in thinking about communication strategies between and within nations goes beyond a "top-down" approach to development. In this approach, local citizens (or entire nations) are in effect told what their problems are and then persuaded to follow certain specific lines of action to solve them. The common results have often been too much local dependence on national governments for development efforts.

Consequently, national and transnational communication strategies have been shifting toward less directive roles to "assist" in what should become a democratic self-development process. What has been technically called center-to-periphery linkages, feedback and forward communication flows, the horizontal and vertical opening-up and re-coupling of social systems and subsystems, and the multilateralization of aid, are now items on development agenda worldwide.

Above, then, we have outlined five major themes of a recent shift in thinking. The five themes and their elements, to be sure, are dynamically interconnected and therefore work in concert. These themes, moreover, are not exhaustive nor are they as fully developed as they could be given more space. Neither has it been my intent to argue the degree of validity of each theme. But each theme should be put to public debate and validated with empirical research where possible. The research to date, to be sure, has been fragmentary.

In the broadest sense, communication, education, and eco-development problems are all problems of preserving and promoting human well-being. And because these problem themes are so intricately interrelated, they all must be conceptualized and worked on together, as a whole. If we try to pick out any problem or alternative solution without considering the context in which it appears, we will surely fail to integrate it properly. The problem of priorities thus begins to disappear when you talk in terms of General Systems because all problems must be worked on together. For example, in making an automobile, you cannot start by working on a valve or wheel alone. You must work on the whole system at one time to make the car work. Each theme should therefore be a potential policy target.

I will argue, however, that the communication and development experiences of the last few decades (particularly in less-developed countries) have taught, or should have taught, national and transnational environmental problem-solvers and policy-developers many lessons. The central lesson is that there are apparently many alternative yet valid pathways to national, regional, and global development. The conventional highly-materialistic and environmentally-damaging model of development, however, has been shown to be generally inappropriate for worldwide development. Advocating or exemplifying unending material growth, for example, seems neither desirable nor possible given the context of the "outer limits" of our planet.

These problem themes, then, provide a context for conducting a worldwide assessment of environmental communication and education resource-needs. Without adequate development of a problem context, General Systems thinking tells us, it would be nearly impossible to accurately decode the meaning of the data on resource-needs.

A WORLDWIDE ASSESSMENT OF NEEDS

Under the aegis of the new United Nations (UNESCO-UNEP) International Environmental Education Program, we have now completed the first worldwide preliminary assessment of environmental education and communication needs. Currently, the UNESCO-UNEP program is in the process of learning how to better use the study's findings, and how to better communicate them forward to other actors in the international system and back to the people assessed.

As initial steps in this communication process, for example, the UNESCO-UNEP program has already held regional workshops in Africa, Asia, Latin America, North America, the Arab States, Central Europe, and Eastern Europe. Two major international workshops were held in Belgrade and the USSR, and another dozen or so formal consultations with non-governmental organizations. In addition, a special-purpose transnational-communication computer network is under development. Currently, about 10,000

individuals and organizations worldwide are linked through the network system. Each of these individuals, moreover, receives a periodic newsletter available in English, Spanish, French, Arabic, or Russian. Each of these means as well as others, then, is being used to initially diffuse the findings of the first worldwide needs-assessment.

Below in a broad-brush outline is the structure and process of the study itself. The study is presented not as the ideal, but merely an expression of what we have been able to do so far given the socio-political context. As in any needs-assessment, the definition of the relevant population to be studied is a central task.

1. Definition of the population. Within our international comparative perspective, then, the most accurate specification of what constitutes "worldwide" would be a composition of every nation and territory on earth. But, as clearly necessary, the definition of "worldwide" had to be equated to the 136 UNESCO member states. This was our first giant sampling step.

The second sampling step defined any particular member state as being composed of the individuals who would complete the survey questionnaire. Consequently, it is clear that the individuals who would complete the questionnaire, and their personal positions and characteristics, would be rather important. Also for purposes of the assessment, the responses of individuals from any single country would have to be grouped together to give a country-level response.

Thus, the country level formed the most fundamental and practical analytic unit. All regional and worldwide descriptions of needs were constructed from "packages" of information obtained at the country level. These packages were constructed by putting a series of questions to groups of individuals who could legitimately represent their country.

2. Selection of respondents. It should be made clear at the outset that a "probability sample" was not practical and therefore not used. Instead, the sample was selected through the application of a substantive set of criteria. The most significant criteria were applied through the instructions given to each country for completing the questionnaire. The strength of the application of these criteria, however, was directly dependent upon the willingness of country officials to abide by the instructions. The elements of these criteria were that the questionnaire be completed by a group of respondents who, as a group, had:

(a) a sound professional competence, diversified across various disciplines related to environmental education and planning (for example: educators, social scientists, engineers);

(b) a high level position within the national administration or some other attributes of a current or potential environmental education opinion leader (for example: government officials, professional representatives); and

(c) a team work approach toward completing the questionnaire so as to capitalize on the diversity of individuals in the production of a country level response.

These criteria were applied with the goal of maximizing the relevance of the information gathered from each country, rather than of finding out what this or that person thought. The selection of respondents assumed that the specialists from various fields would have the relevant and accurate information available to them. Also, because of their central positions in their national communication networks, their knowledge of the actual situation would likely be even more complete.

As could be expected, the set of criteria mentioned above were not applied with the same intensity from country to country. Nevertheless, we found that the average world values attained did indicate that the criteria had been regularly respected. We were also pleased to learn that the majority of respondent groups had about 25 percent women. The respondents, moreover, came from an average of three disciplines. In a word, the general characteristics reflected by the groups of respondents led to the assumption that the information collected had been highly relevant for the purposes of the study.

3. Methods of data collection. The main source of information was a 177-item questionnaire sent to the member states through official government channels. The questionnaire was constructed through a long process of expert consultations and pretesting in major regions of the world. Before our data were initially computer analyzed, we had received a record response-rate of nearly 83 percent. This is remarkably high, considering that the usual response rate for this kind of study is 20-30 percent.

But other methods of gathering information were also used. For instance, 14 professional level consultants were individually sent to 83 different countries with the dual purpose of (a) obtaining further information based upon direct

observation and personal conversation, and (b) encouraging and assisting in the completion of the questionnaire sent through official channels (cf. Horn, 1975b). The information gathered was used to complement and cross-validate the quantitative information gathered through the questionnaire. Real-life examples of in-country activities not only supported quantitative findings, but helped in their interpretation. This multi-method blending of field observation and conversation with mailed questionnaire techniques served to strengthen the study's validity, and it helped generate the communication and eco-development problem themes outlined earlier.

Finally, in addition to the above, statistical data were gathered from official United Nations sources. Such information permitted us to describe the relationships between various aspects of socio-economic development, environmental quality, and the levels of the needs assessed. These background or contextual data, moreover, gave us the opportunity to conduct some more in-depth analyses, such as the discovery of connections among any three or more factors or resource-needs simultaneously.

These more advanced procedures helped us generate in-depth knowledge about the environmental education and communication situation, especially since such in-depth techniques avoid the problem of treating the questionnaire items as being isolated from one another. As Krippendorf has argued,

> confinement to the study of isolated events--however many dimensions may be considered in each case and in whichever discipline this strategy is adopted--will not aid the understanding of how such events are related to other events, how they came about, and to what they will lead in the future (Krippendorf, 1975:148).

The questionnaire items, then, along with the relevant background and contextual information, are treated as clusters of interrelated phenomena. Thus, in addition to basic descriptions, we could also discover large-scale patterns among the regions and countries of the world to give policy-makers at all levels a better sense of what is occurring on the global level and within any particular region and country.

4. Principal findings. The study is so vast that an entire book is needed to organize all of the results of the 136-country project. Most of the data have been, or are being, subsetted and reported back to the particular regions and countries who request them.

A principal conclusion of the study, which reflects the urgency of environmental concerns worldwide, is that the vast majority (71 percent) of the countries surveyed have very high needs for environmental education and communication resources. "Very high" is defined as a need rating equal to or greater than 4 (on a 5-point scale), as given by the respondents. Among the very high needs, those perceived as being the most intense at the world level are:

(1) the training of personnel for environmental education and communication activities (81 percent of the countries),

(2) the preparation of instructional materials and media (73 percent), and

(3) the development of integrative environmentally-oriented programs (68 percent).

Reflecting some of the imbalances among nations, we found that almost all (84 percent) of the countries with a "high" level of need for environmental education and communication programs were from the less-developed regions of Africa, Asia, Latin America, and the Arab States. But some significant pockets of program needs were also found in the more-developed regions.

Other conclusions indicate the necessity of a better integration of activities concerning the environment with other national programs, especially those in the formal education sector. A great deal of stress was also placed on the need to structure the content and orientation of environmental programs around concrete problems, the acquisition of problem-solving skills (cf. Horn, 1975c), and interdisciplinary approaches.

Sixty-eight percent of the countries responding felt the need to strengthen organizations (like the Society for General Systems Research, a UNESCO affiliate) in regard to participation in environmental education and communication activities. In this regard, the less-developed countries expressed a greater need than the more-developed countries. Perhaps there are some future policy implications for the Society here. For example, perhaps the Society could adopt a sliding scale for membership dues to reflect some of the economic disparaties worldwide. The lessening of such economic barriers to participation would permit a great many competent professionals in the poorer nations to actively "promote and encourage the application of unified scientific knowledge in the area of concrete societal problems, for the benefit of individuals, societies, and mankind generally" (Laszlo, 1974:16).

Based on the experience of this pre-

liminary, first-wave study, which provides essential baseline data, the study is designed to be improved and repeated every 3-5 years. Such longitudinal data should help us track some of those increasingly intractable problems and needs. These kinds of data, when related to other past and future studies, in public discussion, should help provide a scientific base for policy-making.

TOWARD AN IDEAL TEC SYSTEM: WORK IN PROGRESS

Within the problem and need-assessment context outlined above, work is in progress (at the University of Michigan) which is ultimately aimed at the development and articulation of an ideal TEC network delivery system based on General Systems concepts. Our current research asks:

(1) What transnational communication factors are likely to inhibit the established needs from being satisfied?

(2) What transnational communication factors are likely to facilitate their being satisfied?

(3) What TEC network strategies and policies are likely to influence various patterns of need satisfaction?

(4) How might these strategies and policies be implemented?

The final output of the research will focus on the generation of a series of "middle-range generalizations," which will attempt to represent consensus findings from a number of studies conducted in a variety of settings in various countries. Useful and knowledge-based transnational communication strategies and policies will also be crystallized from these middle-range generalizations.

In the general area of social problem-solving and policy-development, much related work has been done--although much of it needs to be extended in light of our new problem and need context. At the University of Michigan alone, much relevant work has been already completed (for example, Caplan, 1976; Havelock, 1973; Havelock et al., 1974; Horn and Rogers, 1975; Kar, 1975; Kochen, 1975; Lingwood and Havelock, 1977; Medlin, 1976; Michael, 1973; Nelson, 1977; Pelz, 1977; Rogers, 1973, 1976; and Rogers and Agarwala-Rogers, 1976).

CONCLUSION

This paper has reflected a rather modest attempt to outline some aspects of a transnational environmental problem-solving and policy-development system which is consistent with the fundamental goals we seek--an ecologically-based humanistic society. Richard Falk reminds us that "A first step is to establish lines of communication within and between states to achieve a clearer sense of common danger, and also to foster an early awareness of the directions of change that are needed if mankind is to survive" (1972:92). Let's all join hands to see if we can find the kind of world we would be proud to give to our children.

FOOTNOTE

1. United Nations Educational, Scientific and Cultural Organization (UNESCO), and United Nations Environment Programme (UNEP).

REFERENCES

Barnet, R.J. and Müller, R.E.
1974 Global Reach: The Power of the Multinational Corporations. New York: Simon and Schuster.

Bergsten, C.F.
1973 "The Threat from the Third World." Foreign Policy 11 (summer): 102-24.

Caplan, N. and Rich, R.F.
1976 "Institutional Insularity and Bureaucratization: The Process and Consequence of Information Policy at the National Level." A paper delivered at the OECD Conference on "Dissemination of Economic and Social Development Research Results." Bogotá, Colombia (June). Ann Arbor, Michigan: Center for Research on Utilization of Scientific Knowledge (CRUSK), University of Michigan.

Dorfman, A. and Mattelart, A.
1976 Para Leer al Pato Donald: Comunicación de Masa y Colonialismo. México, D.F.: Siglo Veintiuno.

Falk, R.A.
1972 This Endangered Planet: Prospects and Proposals for Human Survival. New York: Vintage Books.

Halloran, J.D. (ed.)
1976 Mass Media and Socialization: International Bibliography and Different Perspectives. Leicester, England: International Association for Mass Communication Research, University of Leicester.

Havelock, R.G.
1973 "What Do We Know From Research About the Process of Research Utilization." Prepared for the Conference on Making Population/

Family Planning Useful, East-West Communication Institute, East-West Center, Honolulu, Hawaii, 3-7 December.

Havelock, R.G., Glaser, E.M., Lippitt, R.O., Markowitz, E.A., Ramirez, B.B., and Rogers, E.M.
1974 Ideal Systems for Research Utilization: Four Alternatives. Washington, D.C.: Social and Rehabilitation Service (SRS), U.S. Department of Health, Education, and Welfare (HEW).

Horn, B.R.
1975a "The Role of Business, Labor and Industry, and the Mass Media in Environmental Education in Michigan: A Systems Approach." A paper presented at the Annual Meeting of the American Association for the Advancement of Science (AAAS), New York (January).

1975b "Final Report of Environmental Education Mission to South Asia in 1975--Overview." Paris, France: UNESCO-UNEP International Environmental Education Program, UNESCO.

1975c "Communication Skills for Environmental Problem Solving." Pp. 267-89 in N. McInnis and D. Albrecht (eds.), What Makes Education Environmental? Louisville, Kentucky: Environmental Educators and Data Courier. Reprinted in General Semantics Bulletin 44 (1977).

Horn, B.R. and Rogers, E.M.
1975 "Interpersonal Communication of Environmental Education." Pp. 219-37 in N. McInnis and D. Albrecht (eds.), What Makes Education Environmental? Louisville, Kentucky: Environmental Educators and Data Courier.

Kar, S.B.
1975 Communication Research in Family Planning: An Analytical Framework. Population Communication Technical Documentation, No. 2. Paris, France: UNESCO.

Kim, J.Y.
1971 "Feedback and Human Communication: Toward a Reconceptualization." Unpublished doctoral dissertation, The University of Iowa.

Kochen, M. (ed.)
1975 Information for Action: From Knowledge to Wisdom. New York: Academic Press.

Krippendorf, K.
1975 "The Systems Approach to Communication." Pp. 138-63 in B.D. Ruben and J.Y. Kim (eds.), General Systems Theory and Human Communication. Rochelle Park, New Jersey: Hayden.

Laszlo, E.
1974 A Strategy for the Future: The Systems Approach to World Order. New York: George Braziller.

Laszlo, E., et al.
1977 Goals for Mankind: A Report to the Club of Rome on the New Horizons of Global Community. New York: Dutton.

Lingwood, D.A. and Havelock, R.G.
1977 "The Balanced Producer-Client Linkage Exchange: The R&D Exchange As Seen From Models of Knowledge Production and Utilization." Ann Arbor, Michigan: Center for Research on Utilization of Scientific Knowledge, University of Michigan.

Markley, O.W.
1974 Changing Images of Man. Menlo Park, California: Stanford Research Institute.

Matthews, W.H. (ed.)
1976 Outer Limits and Human Needs: Resource and Environmental Issues of Development Strategies. Uppsala, Sweden: Dag Hammarskjold Foundation.

Medlin, W.K.
1976 "Problems in Planning Rural Education for Agricultural and Nutrition Development: A Review of Relevant Findings from Communication Research." Occasional Paper Series. Ann Arbor, Michigan: School of Education, University of Michigan.

Mesarovic, M. and Pestel, E.
1974 Mankind at The Turning Point: The Second Report to The Club of Rome. New York: Dutton.

Michael, D.N.
1973 On Learning to Plan--and Planning to Learn: The Social Psychology of Changing Toward Future-Responsive Societal Learning. San Francisco: Jossey-Bass.

Naesselund, G.R.
1975 Opening speech at the "Media Workshop for Journalists and Broadcasters," Mexico City, 3-4 July. Paris, France: Department of Free Flow of Information and Development of Communication, UNESCO. COM-75/WS/29.

Nelson, S.D.
1977 "A General Systems Perspective on Governmental Use of Social Science Knowledge." Pp. 301-307 in The

General Systems Paradigm: Science of Change and Change of Science. Washington, D.C.: Society for General Systems Research.

Nordenstreng, K., and Varis, T.
1974 Television Traffic--A One-Way Street? A Survey and Analysis of the International Flow of Television Programme Material. Reports and Papers on Mass Communication, No. 70. Paris, France: UNESCO.

Pelz, D.C.
1977 "Utilization of Knowledge on Management of R&D Units: A State-of-the-Art Review." Prepared for the Division of Science and Technology Policies, UNESCO, Paris, as background for the International Comparative Study on the Organization and Performance of Research Units. Ann Arbor: Institute for Social Research, University of Michigan.

Rapoport, A.
1975 "Modern Systems Theory--An Outlook for Coping with Change." Pp. 33-51 in B.D. Ruben and J.Y. Kim (eds.), General Systems Theory and Human Communication. Rochelle Park, New Jersey: Hayden.

Richstad, J. and Harms, L.S. (eds.)
1973 World Communication: Population Communication, Communication Technology, Communication in the Future; Proceedings of the East-West Center Conference, Honolulu. Honolulu: East-West Center.

Rogers, E.M.
1973 Communication Strategies for Family Planning. New York: Free Press.

Rogers, E.M. (ed.)
1976 "Communication and Development: Critical Perspectives." Special issue of Communication Research: An International Quarterly 3 (April).

Rogers, E.M. and Agarwala-Rogers, R.
1976 Communication in Organizations. New York: Free Press

Rogers, E.M. and Shoemaker, F.F.
1971 Communication of Innovations: A Cross-Cultural Approach. 2d ed. New York: Free Press.

Saint, W.S. and Coward, E.W.
1977 "Agriculture and Behavioral Science: Emerging Orientations." Science 197 (August): 733-37.

Schramm, W.
1964 Mass Media and National Development: The Role of Information in the Developing Countries. Paris, France: UNESCO.

Schramm, W. and Lerner, D. (eds.)
1976 Communication and Change: The Last Ten Years--and the Next. Honolulu: University Press of Hawaii.

Schumacher, E.F.
1973 Small Is Beautiful: Economics as if People Mattered. New York: Harper & Row.

Somavía, J.
1977 "International Communications and Third World Participation." Development Dialogue 2: 138-44.

Tinbergen, J., Dolman, A.J. and van Ettinger, J. (eds.)
1976 Reshaping The International Order: A Report to The Club of Rome. New York: Dutton.

UNESCO (ed.)
1975 Getting the Message Across: An Inquiry into Successes and Failures of Cross-Cultural Communication in the Contemporary World. Paris. The Unesco Press.

UNESCO
1977 "Major Environmental Problems in Contemporary Society." Document No. 8 of the Intergovernmental Conference on Environmental Education organized by Unesco in cooperation with UNEP, Tbilisi (USSR), 14-26 October.

Weisskopf, T.E.
1977 "Dependence as an Explanation of Underdevelopment: A Critique." Discussion Paper No. 66. Ann Arbor, Michigan: Center for Research on Economic Development (CRED), The University of Michigan.

World Bank, The
1975 The Assault on World Poverty: Problems of Rural Development, Education and Health. Baltimore: Johns Hopkins University Press.

Author
B. Ray Horn
Environmental Communication Program
School of Natural Resources
The University of Michigan
Ann Arbor, Michigan 48109 USA

—o—

ABOUT THE AUTHOR

B. RAY HORN is currently conducting research on transnational environmental communication problems and strategies with the Environmental Communication Program, School of Natural Resources, The University of Michigan, Ann Arbor. Formerly, he was with the United Nations (UNESCO-UNEP) International Environmental Education Program at their Paris, France, Headquarters, where he recently completed a study of environmental education and communication resource needs in 136 countries. Besides having been a consultant to a number of national and state governments, he was formerly the Planning Coordinator and Executive Director of the Governor's Environmental Education Task Force, Executive Office of the Governor, State of Michigan.

His doctoral work is in Natural Resources from The University of Michigan, where he focused on environmental education and communication problems and strategies. Besides having taught at The University of Michigan, he has also taught full-time for a number of years at Northern Illinois University, Southern Illinois University, and has been a Visiting Associate Professor at Bemidgi State College, Minnesota. In collaboration with William B. Stapp and others, he wrote Michigan's Environmental Future (Lansing: State of Michigan, 1973) which has been used as a planning model by many national and state governments. He has published over 35 professional papers, articles, and chapters in books, dealing with the interactions among environmental, educational, communication, and planning issues, such as "Interpersonal Communication of Environmental Education"(with Everett M. Rogers). Horn's work has received a number of commendations, such as the U.S. Environmental Protection Agency's (EPA) First Annual Environmental Quality Award and a Certificate of Appreciation from the President of the United States for contributions in the international development field.

B. RAY HORN
SCHOOL OF NATURAL RESOURCES
UNIVERSITY OF MICHIGAN
ANN ARBOR, MICHIGAN 48109